

What is claimed is:

1. A method of fabricating a fluid feed slot in a print head substrate, comprising:

making a cut into a first surface of a substrate using a cutting disk having a  
5 generally planar surface that is oriented generally perpendicular to the first surface;  
and,

removing material from a second surface of the substrate effective to form,  
in combination with said cut, a slot at least a portion of which passes entirely  
through the substrate.

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2. The method of claim 1, wherein said making a cut into the first surface  
comprises making a cut into a thin film side of the substrate.

3. The method of claim 1, wherein said making a cut into the first surface  
15 comprises making a cut with the saw blade being moved in both the x and y  
directions relative to the substrate.

4. The method of claim 1, wherein said making a cut into the first surface  
comprises making a cut into a backside of the substrate.

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5. The method of claim 1, wherein said making a cut with the disk comprises making a cut with a circular saw.

6. The method of claim 1, wherein said making a cut into the first surface  
5 comprises making a cut at least a portion of which extends through the substrate.

7. The method of claim 1, wherein said making a cut comprises making multiple passes with the disk to cut a desired thickness.

10 8. The method of claim 1, wherein said removing comprises making a second cut with a disk.

9. The method of claim 1, wherein said removing comprises one or more of: sand drilling, dry etching, wet etching, and drilling with a rotary drill bit.

5 ninety degrees relative to the substrate.

said act of making a cut.

claim 1. 347/20-85

comprising:

first and second surfaces; and,

**substrate.**

14. The method of claim 13, wherein said creating comprises cutting with a circular saw.

15. The method of claim 14, wherein said cutting comprises moving the  
5 circular saw in a first direction substantially perpendicular to the first surface.

16. The method of claim 15, wherein said cutting further comprises moving the circular saw in a second direction substantially parallel to the first surface.

10 17. The method of claim 15, wherein said cutting further comprises moving the circular saw in a first direction substantially perpendicular to the first surface and in a second direction substantially parallel to the first surface.

18. The method of claim 14, wherein said cutting comprises making multiple  
15 passes with the circular saw.

19. The method of claim 13, wherein said act of cutting occurs prior to said act of creating.

20 20. The method of claim 13, wherein said creating comprises etching substrate material.

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21. The method of claim 13, wherein said creating comprises sand drilling substrate material.

22. The method of claim 13, wherein said creating comprises drilling substrate  
5 material with a rotary bit.

23. A fluid ejecting device having a substrate made according to the method of claim 13.

10 24. A method of forming slots in a semiconductor substrate containing microelectronics comprising:

removing material from a first side of the semiconductor substrate; and,

removing material from a second side of the semiconductor substrate  
wherein removing material from at least one of the first and second sides is  
15 accomplished with a mechanical cutting tool having a circular cutting disk revolving around an axis and where the cutting disk cuts the semiconductor substrate with the axis generally parallel to the first and second surfaces of the semiconductor substrate, and wherein at least portions of the removing from the first side and removing from the second side form a slot through the substrate  
20 material.

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25. The method of claim 24, wherein both removing from a first side and removing from a second side comprise cutting the substrate with the cutting tool.

26. The method of claim 24, wherein removing material from a first side  
5 comprises removing material from the substrate by wet etching the first side.

27. The method of claim 24, wherein removing material from a first side and removing material from a second side form a slot having an aspect ratio of greater than or equal to 1.

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28. The method of claim 24, wherein removing material from a first side and removing material from a second side form a slot having an aspect ratio in a range from about 1 to about 22.

15 29. The method of claim 24, wherein removing material from a first side and removing material from a second side form a slot having an aspect ratio of greater than or equal to 22.

30. The method of claim 24, wherein removing material from a first side  
20 comprises removing material by dry etching the first side.

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31. The method of claim 24, wherein removing material from a first side comprises removing material by laser machining a first side.

32. A fluid ejecting device having a substrate made in accordance with the  
5 method of claim 24.

33. A method of forming slots in a semiconductor substrate having first and second opposing surfaces comprising:

removing material from either a first or second surface; and,

10 making a mechanical cut into the other of the first or second surface effective to form in combination with said removing, a slot at least a portion of which passes entirely through the substrate, wherein the slot has an aspect ratio greater than or equal to one.

15 34. The method of claim 33, wherein said removing occurs prior to making the mechanical cut.

35. The method of claim 33, wherein said making a mechanical cut occurs prior to said removing.

36. The method of claim 33, wherein said removing comprises one of dry etching, wet etching, cutting, or laser ablating the substrate.

37. The method of claim 36, wherein said removing comprises removing thin  
5 film material from the first surface.

38. The method of claim 33, wherein said removing comprises sand drilling, and wherein said sand drilling removes material from a backside.

10 39. The method of claim 38, wherein said sand drilling occurs prior to said making of the mechanical cut.

40. A fluid ejecting device having a substrate made in accordance with the method of claim 33.



41. A method of forming slots in a semiconductor substrate having first and second opposing surfaces comprising:

making a cut into a first surface of a semiconductor substrate using a cutting tool, wherein the cutting tool has an axis of rotation generally parallel to the first surface; and,

removing material from a second surface of the semiconductor substrate effective to form, in combination with said cut, a slot at least a portion of which passes entirely through the semiconductor substrate.

42. A fluid ejecting device having a substrate made in accordance with the method of claim 41.

43. A method of forming slots in a semiconductor substrate having first and second opposing surfaces comprising:

making a cut into a first surface of a semiconductor substrate using a cutting tool, wherein the cutting tool has an axis of rotation that is not perpendicular to the first surface; and,

removing material from a second surface of the semiconductor substrate effective to form, in combination with said cut, a slot at least a portion of which passes entirely through the substrate.

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44. A fluid ejecting device having a substrate made in accordance with the method of claim 43.

class  
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45. One or more computer-readable media having computer readable

5 instructions thereon which, when executed by a computer, cause the computer to:

cause material to be removed from either the first or second surfaces of a semiconductor substrate; and,

cause a mechanical cut to be made into the other of the first or second surfaces of a semiconductor substrate effective to form in combination with said  
10 removing, a slot at least a portion of which passes entirely through the substrate.

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